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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
95/001,399 +95/000524	07/16/2010	7497943	IND4-29741-USRX-1	5884

87884 7590 03/11/2013
Mossman, Kumar and Tyler, PC
P.O. Box 421239
Houston, TX 77242

EXAMINER
KUNZ, GARY L

ART UNIT	PAPER NUMBER
3991	

MAIL DATE	DELIVERY MODE
03/11/2013	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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95/000,524 95/001,399	12/12/2009	7497943	IND4-29741-USRX	9423

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THIRD PARTY REQUESTER'S CORRESPONDENCE ADDRESS
K&L GATES LLP
P.O. BOX 1135
CHICAGO, IL 60690

Date:

MAILED

MAR 11 2013

CENTRAL REEXAMINATION UNIT

Transmittal of Communication to Third Party Requester
Inter Partes Reexamination

REEXAMINATION CONTROL NO. : 95001399
PATENT NO. : 7497943
ART UNIT : 3991

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above-identified reexamination proceeding. 37 CFR 1.903.

Prior to the filing of a Notice of Appeal, each time the patent owner responds to this communication, the third party requester of the inter partes reexamination may once file written comments within a period of 30 days from the date of service of the patent owner's response. This 30-day time period is statutory (35 U.S.C. 314(b)(2)), and, as such, it cannot be extended. See also 37 CFR 1.947.

If an ex parte reexamination has been merged with the inter partes reexamination, no responsive submission by any ex parte third party requester is permitted.

All correspondence relating to this inter partes reexamination proceeding should be directed to the Central Reexamination Unit at the mail, FAX, or hand-carry addresses given at the end of the communication enclosed with this transmittal.

Transmittal of Communication to Third Party Requester *Inter Partes* Reexamination	Control No. 95/001,399 ; 95/000,524	Patent Under Reexamination 7497943	
	Examiner GARY KUNZ	Art Unit 3991	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address. --

(THIRD PARTY REQUESTER'S CORRESPONDENCE ADDRESS)

K & L GATES LLP
P.O. BOX 1135
CHICAGO, IL 60690

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Transmittal of Communication to Third Party Requester *Inter Partes* Reexamination	Control No. 95/001,399 ; 95/000,524	Patent Under Reexamination 7497943	
	Examiner GARY KUNZ	Art Unit 3991	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address. --

(THIRD PARTY REQUESTER'S CORRESPONDENCE ADDRESS)

DAVIDSON, DAVIDSON & KAPPEL, LLC
485 7TH AVENUE
NEW YORK, NY 10018

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above-identified reexamination prceeding. 37 CFR 1.903.

Prior to the filing of a Notice of Appeal, each time the patent owner responds to this communication, the third party requester of the *inter partes* reexamination may once file written comments within a period of 30 days from the date of service of the patent owner's response. This 30-day time period is statutory (35 U.S.C. 314(b)(2)), and, as such, it cannot be extended. See also 37 CFR 1.947.

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All correspondence relating to this inter partes reexamination proceeding should be directed to the **Central Reexamination Unit** at the mail, FAX, or hand-carry addresses given at the end of the communication enclosed with this transmittal.

Right of Appeal Notice (37 CFR 1.953)	Control No.	Patent Under Reexamination
	95/001,399 & 95/000,524	7497943
	Examiner	Art Unit
	GARY KUNZ	3991

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address. --

Responsive to the communication(s) filed by:
Patent Owner on 22 August, 2012
Third Party(ies) on 30 August, 2012

Patent owner and/or third party requester(s) may file a notice of appeal with respect to any adverse decision with payment of the fee set forth in 37 CFR 41.20(b)(1) within **one-month or thirty-days (whichever is longer)**. See MPEP 2671. In addition, a party may file a notice of **cross** appeal and pay the 37 CFR 41.20(b)(1) fee **within fourteen days of service** of an opposing party's timely filed notice of appeal. See MPEP 2672.

All correspondence relating to this inter partes reexamination proceeding should be directed to the **Central Reexamination Unit** at the mail, FAX, or hand-carry addresses given at the end of this Office action.

If no party timely files a notice of appeal, prosecution on the merits of this reexamination proceeding will be concluded, and the Director of the USPTO will proceed to issue and publish a certificate under 37 CFR 1.997 in accordance with this Office action.

The proposed amendment filed 22 August, 2012 ☒ will be entered ☐ will not be entered*

*Reasons for non-entry are given in the body of this notice.

1a. ☒ Claims 1,5,6,9,17 and 26-32 are subject to reexamination.
1b. ☒ Claims 2-4,7,8,10-16 and 18-25 are not subject to reexamination.
2. ☐ Claims _____ have been cancelled.
3. ☒ Claims 9 are confirmed. [Unamended patent claims].
4. ☒ Claims 27-29 are patentable. [Amended or new claims].
5. ☐ Claims _____ are rejected.
6. ☐ Claims _____ are objected to.
7. ☐ The drawings filed on _____ ☐ are acceptable. ☐ are not acceptable.
8. ☐ The drawing correction request filed on _____ is ☐ approved. ☐ disapproved.
9. ☐ Acknowledgment is made of the claim for priority under 35 U.S.C. 119 (a)-(d) or (f). The certified copy has:
   ☐ been received. ☐ not been received. ☐ been filed in Application/Control No. _____.
10. ☐ Other _____

Attachments

1. ☒ Notice of References Cited by Examiner, PTO-892
2. ☐ Information Disclosure Citation, PTO/SB/08
3. ☐ _____

Inter Partes Reexamination: Right of Appeal Notice (RAN)

Procedural Posture

1. U. S. Patent No. 7,497,943 issued to Nguyen et al. on March 3, 2009.

2. Third Party Requester No. 1 (Assateague Oil Inc.) filed a request for inter partes reexamination of claims 1, 5, 6, and 17 of the Nguyen '943 patent on December 12, 2009. This proceeding was assigned control number 95/000,524

3. Determination granting inter partes reexamination of claims 1, 5, 6 and 17 of the Nguyen '943 patent and a First Office Action were mailed on February 4, 2010.

4. Patent Owner filed a response to the First Office Action on April 5, 2010.

5. Third Party Requester No. 1 filed comments to the Patent Owner response on May 4, 2010.

6. Third Party Requester No. 2 (Nalco Co.) filed a request for inter partes reexamination of claims 1, 9 and 17 of the Nguyen '943 patent on July 16, 2010. This second proceeding was assigned control number 95/001,399.

7. Determination granting inter partes reexamination of claims 1, 9 and 17 of the Nguyen '943 patent as requested by the Third Party Requester No. 2 was mailed September 17, 2010 (Control No. 95/001,399).

8. Inter partes reexamination control nos. 95/000,524 and 95/001,399 were merged in the decision dated July 20, 2011. No housekeeping amendment was required.

9. Non-final Office Action was mailed on August 2, 2011.

10. Non-compliant Response by Patent Owner was filed October 3, 2011. New claims 26 – 32 were added.

11. Third Party No. 2 (Nalco Co.) Response to Non-compliant Response by Patent Owner was filed November 2, 2011.

12. Notification of Defective Paper (Patent Owner Response of 10/3/11) was mailed on December 21, 2011.

13. Compliant Patent Owner Response was filed on January 23, 2012. New claims 26 – 32 were added.

14. Third Party No. 2 Response to Compliant Patent Owner Response was filed February 21, 2012.

15. The Third Party Requester No. 1 (Assateague Oil) did not file any Comments to the Patent Owner's Response of January 23, 2012.

16. Action Closing Prosecution was mailed on June 21, 2012.

17. Patent Owner filed a response to the Action Closing Prosecution on July 23, 2012.

16. Notification of Defective Paper mailed to Patent Owner on August 9, 2012.

17. Patent Owner filed a compliant response to the Notification of Defective Paper on August 14, 2012.

18. Third Party Requester No. 2 filed comments to the compliant Patent Owner Response on August 30, 2012.

19. The Third Party Requester No. 1 (Assateague Corp.) did not filed any Comments concerning the compliant Patent Owner response of August 14, 2012.

Papers Submitted After ACP

In the Action Closing Prosecution (ACP) dated 8/2/11, the Examiner did not adopt proposed Ground of Rejection Nos. 7 and 8 because the transcript of the Weers' testimony was incomplete; the transcript was initially designated confidential pursuant to a protective order. Since the Requester and Patent Owner have agreed to provide the entire testimony of Dr. Weers with minor redactions, the Third Party Requester No. 2 (Nalco Company) has now submitted a more complete transcript with minor redactions of Dr. Weers' testimony taken during the Preliminary Injunction Hearing in H-09-CV-1885. This more complete transcript of Dr. Weers' testimony is entered into the record and is responsible for Ground of Rejection Nos. 7 and 8 being adopted in this RAN.

The declaration by Dr. Jerry Weers accompanied by copies of the plaintiffs' and defendant's briefs before the Court of Appeals Federal Circuit submitted by the Patent Owner are entered into the record.

The Patent Owner has submitted new claims 26 – 32 corresponding to original claims 1 – 6 and 17 but with the following phrase deleted, "and ammonium salts and alkali metal salts of these hydroxyacids." New claims 26 - 32 are entered into the record.

Information Disclosure Statement (IDS)

In the Response to the ACP of July 23, 2012, the Patent Owner cited to two documents (Alatiqi et al. at page 32 and Eldib et al. at page 51) and presented copies of these documents. However, the Patent Owner failed to enter these documents on an appropriate PTO form. The Examiner has entered these documents on a PTO Form-892. A copy of this document accompanies this communication.

Status of Claims

There are 25 claims in the original Nguyen '943 patent. In the 95/000,524 proceeding, Third Party Requester No. 1 requested that claims 1, 5, 6 and 17 be reexamined. In the 95/001,399 proceeding, Third Party Requester No. 2 requested that claims 1, 9 and 17 be reexamined. Thus, in this merged reexamination, claims 1, 5, 6, 9 and 17 are under reexamination. Claims 2 - 4, 7, 8, 10 - 16 and 18 - 25 are not under Reexamination.

New claims 26 – 32 were added by the Patent Owner in the Response to the ACP filed 8/14/12. These claims have been entered. Therefore, claims 1, 5, 6, 9, 17 and 26 - 32 are now under reexamination.

In the copy of the claims submitted by the Patent Owner on 10/3/11 and 1/23/12, claim 1, line 2 contains what the examiner believed was a typographical error. The phrase "consisting of" has been replaced by "comprising." On July 23, 2012, The Patent Owner submitted a copy of the claims with this typographical error corrected.

Scope of the Claims

In reexamination, patent claims are construed broadly. *In re Yamamoto*, 740 F.2d 1569, 1571, 222 USPQ 936 (Fed. Cir. 1984) (claims given "their broadest reasonable interpretation consistent with the specification). The Nguyen '943 patent contains claims directed to a method of transferring metals and/or amines from a hydrocarbon phase to a water phase in a refinery desalting process. Claim 1 is representative:

1. A method of transferring metals and/or amines from a hydrocarbon phase to a water phase in a refinery desalting process consisting of:

adding to a wash water, an effective amount of a composition to transfer metals and/or amines from a hydrocarbon phase to a water phase comprising at least one water-soluble hydroxyacid selected from the group consisting of glycolic acid, gluconic acid, C_2-C_4 alpha-hydroxy acids, malic acid, lactic acid poly-hydroxy carboxylic acids, thioglycolic acid, chloroacetic acid, polymeric forms of the above hydroxyacids, polyglycolic acids, glycolate ethers, and ammonium salts and alkali metal salts of these hydroxyacids, and mixtures thereof;

lowering the pH of the wash water to 6 or below, before, during and/or after adding the composition;

adding the wash water to crude oil to create an emulsion; and

resolving the emulsion into hydrocarbon phase and an aqueous phase using electrostatic coalescence, where at least a portion of the metals and/or amines are transferred to the aqueous phase.

The Examiner has construed the phase "lowering the pH" to mean "lowering the pH" of the wash water to 6 or below before, during and/or after adding the hydroxyacid to the water, all before adding the hydroxyacid aqueous composition to the crude oil to create the emulsion. Thus "lowering the pH" of the wash water to 6 or below is fully met when the acid form of a hydroxyacid or salt is added to water as long as the final pH is 6 or below.

In the Response of 1/23/12, the Patent Owner amended claim 9 by further defining the demulsifier component as a "water-in-oil" demulsifier. Claim 9 has been deemed patentable over the prior art of record.

Grounds of Rejection in Merged Proceeding 95/000,524
(Third Party Requester No. 1 is Assateague Oil)

Ground of Rejection No. 1: Adopted

Claims 1, 5, 6, 17, 26 and 30 - 32 are rejected under 35 USC 103(a) as being obvious over **Reynolds** (U. S. 4,789,463) in view of **Hart** (5,078,858) as set forth in the '524 request at pages 4 – 6 and 8 – 11. This rejection has been modified by the addition of new claims 26 and 30 - 32. This rejection **is adopted** for the reasons under "Response to Arguments Regarding Ground of Rejection Nos. 1 and 2" in this Office action and for the reasons set forth below.

Reynolds describes a process for transferring metal ions (particularly iron and calcium) (Abstract; 3:22-25) from a hydrocarbon phase to a water phase consisting of the following steps: (1) adding a hydroxyacid to a wash water (3:11-25) thereby (2) lowering the pH to around 6 or below (3:35-37); (3) adjusting the pH upward with a base to a preferred pH of around 6

(3:62-66); (4) mixing the wash water with crude oil to form a temporary emulsion (2:5-7); (4) and separating the wash water phase from the crude oil phase (2:52-55; 59-65).

Reynolds further describes separating the water phase from the crude oil by a physical separation process that is ordinarily done in a conventional crude oil desalter (2:59-65; claim 13). Although it is well known in the art that desalters contain a mixing valve to create an emulsion and electrostatic coalescence equipment, Reynolds does not explicitly disclose the use of a mixing value to create an emulsion or an electrostatic dehydrator in a desalter to separate the aqueous phase from the crude oil phase.

However, Hart does disclose using a desalter that contains a mixing valve to create an emulsion of crude oil and wash water which is then resolved in a desalting apparatus by electrostatic coalescence. Hart recites the following teachings at column 2, lines 43 - 48:

> [p]referably, the emulsion is resolved in a conventional desalter apparatus. In typical desalters, optional pH operating conditions are maintained at from about 6 – 10 in order to retard corrosion and enhance emulsion resolution. Conventional desalters also utilize heat treatment and electric fields to aid in emulsion resolution.

It would have been obvious to the person of ordinary skill in the art at the time of the invention to modify the method of Reynolds by specifically using a mixing valve in a commercial desalter to form an emulsion between crude oil and wash water containing a hydroxy-carboxylic acid (malic acid, lactic acid or citric acid) at around pH 6, and then to resolve the emulsion by electrostatic coalescence as taught by Hart and referred to as the conventional separation technique described in Reynolds at column 2, lines 59 – 65 and claim 13. Thus, claims 1 and 26 of Nguyen '943 are *prima facie* obvious over Reynolds in view of Hart.

Claim 5 depends from claim 1 and further requires that the hydroxyacid is present in an aqueous composition in an amount ranging from 1 to about 2000 ppm. New claim 30 depends from new claim 26 and also requires that the hydroxyacid is present in an aqueous composition in an amount ranging from 1 to about 2000 ppm. Reynolds meets this limitation in Examples 1 - 4 which disclose an implicit emulsion of an oil containing 51 ppm Fe with an aqueous solution containing a molar ratio of Fe to citric acid (e.g., hydroxycarboxylic acid) of from 1:8 (See Table III, column 4 of Reynolds). A molar ratio of from 1:8, iron to citric acid, yields a value of 1800 ppm of citric acid, which value falls within the required about 1 to about 2000 ppm concentration of claims 5 and 30 of the Nguyen '943 patent.[1]

Claims 6 and 17 depend from claim 1 and further require that the wash water composition contains water. Similarly, new claims 31 and 32 depend from claim 30 and further require that the wash water composition contains water. This limitation is also met by Reynolds which teaches that the aqueous composition comprises water and a hydroxyacid. (Abstract and claims 1, 5 and 6). Thus, claims 5, 6, 17 and 30 - 32 are also *prima facie* obvious over Reynolds in view of Hart.

Ground of Rejection No. 2: Adopted

Claims 1, 5, 6, 17, 26 and 30 - 32 are rejected under 35 USC 103(a) as being obvious over **Reynolds** in view of **SU 1666520** (Union of Soviet Socialist Republic patent, hereinafter "SU '520," all references to SU '520 are with respect to the English translation which accompanied the request) as set forth in the '524 request at page 4, line 15 through page 11, line 13. This

[1] Molecular Weight of Fe = 55.8; citric acid = 192. The weight ratio of citric acid to Fe is 192/55.8 = 3.4. At a molar ratio of 8:1, citric acid to Fe, a composition containing 51 ppm of Fe would contain 51 ppm x 4.4 x 8 = 1800 ppm of citric acid. A similar calculation for malic acid (MW 143) give 980 ppm.

rejection has been modified by the addition of new claims 26 and 30 – 32. This rejection **is adopted** for the reasons presented under "Response to Arguments Regarding Ground of Rejection Nos. 1 and 2 in this Office action and for the reasons set forth below.

The teachings of Reynolds have been presented under Ground of Rejection No. 1 above. The only difference between the process of desalting crude oil according to Reynolds and the claimed desalting process is the use of a desalter mixing valve to create an emulsion of crude oil and a wash water containing a hydroxyacid[2] and the use of electrostatic coalescence to resolve said emulsion. Reynolds does not specifically use the term mixing valve or electrostatic coalescences, but does refer to any conventional desalter separation process at column 2, lines 59 – 65, and in claim 13.

However, SU '520 discloses that during desalting of crude oil, it is conventional to use mixing valve to form an intensive emulsion between crude oil and wash water and to use an electrodehydrator (i.e., electrostatic coalescence) to resolve the emulsion (paragraph following Example 19 on page 3 of English translation).

It would have been obvious to the person of ordinary skill in the art at the time of the invention to modify the method of Reynolds by using a conventional desalting apparatus with a mixing valve to create an intensive emulsion between the crude oil and the wash water and an electrodehydrator to resolve the emulsion by electrostatic coalescence as taught by SU '520. Thus, claims 1 and 26 of Nguyen '943 are *prima facie* obvious over Reynolds in view of SU '520.

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[2] The term "hydroxycarboxylic acid" used in the Nguyen '943 patent is the same compound as "hydroxo-carboxylic acid" used in Reynolds. In addition, the term "hydroxyacid" is a shorthand version of "hydroxycarboxylic acid" and "hydroxo-carboxylic acid.

Claim 5 depends from claim 1 and further requires that the hydroxyacid is present in an aqueous composition in an amount ranging from 1 to about 2000 ppm. New claim 30 depends from new claim 26 and also requires that the hydroxyacid is present in an aqueous composition in an amount ranging from 1 to about 2000 ppm. Reynolds meets this limitation in Examples 1 - 4 which disclose an emulsion from an oil containing 51 ppm Fe with an aqueous solution containing a molar ratio of Fe to citric acid (e.g., hydroxycarboxylic acid) of from 1:8 (See Table III, column 4 of Reynolds). A molar ratio of from 1:8, Fe to citric acid, would encompass yield a value of 1800 ppm of citric acid, a value falling within the range of about 1 to about 2000 ppm concentration specified by claims 5 and 30 of the Nguyen '943 patent.[1]

Claims 6 and 17 depend from claim 1 and further require that the wash water composition contains water. Claims 31 and 32 depend from claim 26 and further require that the wash water composition contains water. This limitation is also met by Reynolds which teaches that the aqueous composition comprises water and a hydroxyacid. (Abstract and claims 1, 5 and 6). Thus, claims 5, 6, 17 and 30 - 32 are also *prima facie* obvious over Reynolds in view of SU '520.

Grounds of Rejection Proposed in Merged Proceeding 95/001,399
(Third Party Requester No. 2 is Nalco)

Ground of Rejection No. 3: Not Adopted

Third Party Requester No. 2 (Nalco) proposed that claims 1 and 17 are obvious over **Strong** in view of **Naeger** as set forth in the '1399 request at pages 6 - 9. This proposed rejection is <u>not adopted</u> for the following reasons. Third Party Requester No. 2 did not address this proposed Ground of Rejection No. 3 in the Comments after ACP filed 8/22/12.

Claims 1 and 17 of Nguyen '943 contain the closed language, "consisting of" with respect to the steps permitted in the desalting process. However, Strong further requires that the desalting process comprises adding to the crude oil an aromatic hydrocarbon having 6 - 9 carbon atoms per molecule, such as benzene, toluene, and xylene (Strong at column 2, lines 10 - 13). Strong requires that this aromatic hydrocarbon be added to the crude oil prior to the addition of the wash water (Strong in Abstract and claims 1 - 9).

Furthermore, Strong teaches adding to the water phase a carboxylic acid having one to six carbon atoms (Strong at column 2, lines 19 – 25; claims 3, 4 and 8). The preferred carboxylic acid is acetic acid (Strong at column 2, line 23 - 25 and claim 5). However, claims 1 and 17 of Nguyen '943 require that a hydroxyacid be added to the water phase instead of a carboxylic acid.

Although Naeger does disclose the use of an electrostatic coalescence device for resolving the emulsion into a hydrocarbon and water phase, Naeger does not cure the other deficiencies of Strong. Naeger teaches the addition of an organic amine and a strong base such as potassium hydroxide to the water phase instead of a hydroxyacid as claimed (Naeger, Abstract and claim 1).

For the all of the above reasons, Strong in view of Naeger does not render obvious claims 1 and 17 of the Nguyen '943 patent.

Proposed Ground of Rejection No. 4: Not Adopted

The Third Party Requester No. 2 proposed that claims 1 and 17 are obvious over **Petroleum Refining** in view of **Hickok** as set forth in the '1399 request at pages 9 – 11. This rejection is not adopted for the reasons for the following reasons.

Petroleum Refining discloses a method of removing impurities such as salts and metals from crude oil in the refinery desalting process (page 42). Petroleum Refining further teaches adding an acid to the inlet water (i.e., the desalter wash water) to adjust the pH from 6 – 8, with a preferred value of near 6 (pages 42 and 50).

Petroleum Refining does not specifically disclose the use of a mixing valve to create a emulsion. Petroleum Refining discloses the use of adding an acid to wash water but does not describe a need for a more efficient method for removing metal ions from crude oil. Petroleum Refining does not disclose the use of hydroxyacids in the wash water. Even though Hickok does disclose the use of hydroxyacids in wash water to remove, extraction or transfer metal ions from a hydrophobic phase (gasoline), Petroleum Refining lacks the requisite teaching that there is a need in the art for an improved method for removes salts from crude oil. Without such a teaching in Petroleum Refining, hindsight can be the only motivation to combine Petroleum Refining with Hickok in order to arrive at the claimed invention. Thus, Petroleum Refining is not properly combinable with Hickok.

Proposed Ground of Rejection No. 5: Not Adopted

Third Party Requester No. 2 (Nalco) proposed that claims 1 and 17 are obvious over **Petroleum Refining** in view of **Strong** as set forth in the '1399 request at pages 11 - 12. This rejection is <u>not adopted</u> for the reasons set forth below. Third Party Requester No. 2 did not address proposed Ground of Rejection No. 5 in Comments after ACP filed 8/22/12.

The teachings of Petroleum Refining at pages 42 and 50 are set forth under Ground of Rejection No. 4 above. The only limitation of claims 1 and 17 not disclosed by Petroleum Refining is the addition of hydroxyacids to the water wash. However, Strong does not cure this

deficiency because this reference only discloses the addition of carboxylic acids having from 1 to 6 carbon atoms per molecule. Acetic acid is the preferred carboxylic acid according to Strong. Acetic acid is not a hydroxyacid as required by claims 1 and 17. Consequently, there can be no *prima facie* case of obvious over claims 1 and 17 where neither Petroleum Refining nor Strong discloses the specific limitation of the addition of hydroxyacids to the water wash.

Proposed Ground of Rejection No. 6: Not Adopted

Third Party Requester No. 2 (Nalco) proposed that claims 1 and 17 are obvious over **Strong** in view of the **Patent Owner Admissions** (Testimony by Dr. Jerry Weers in Transcript from Preliminary Injunction Hearing on 9/1/09) as set forth in the '1399 request at pages 13 – 14. This rejection is not adopted for the reasons presented below. Third Party Requester No. 2 did not address proposed Ground of Rejection No. 6 in the Comments after ACP filed 8/22/12.

Neither the Patent Owner Admission nor the Strong reference discloses the addition of hydroxyacids to the wash water during the process of desalting crude oil. For this reason, Strong in view of Patent Owner Admissions does not establish a *prima facie* case of obviousness for claims 1 and 17.

Proposed Ground of Rejection No. 7: Adopted

Claims 1, 17, 26 and 32 are rejected under 35 USC 103(a) as being unpatentable over **Patent Owner Admissions** (Testimony by Dr. Jerry Weers in the Transcript from the Preliminary Injunction Hearing on 9/1/09) in view of **Hickok** as set forth in the request at pages 14 – 16. This rejection has been modified by the addition of new claims 26 and 32 which correspond to original claims 1 and 17. This proposed rejection **is adopted** for the reasons set forth below.

The Patent Owner Admissions as provided in the Weers' testimony during the Preliminary Injunction Hearing on 9/1/09 establish that the commercial desalters all have a

mixing valve and electrostatic plates for performing electrostatic coalescence. Weers testified that "In every desalter that I've ever seen there's always a demulsifier; there's always heating going on; there's always a mix valve to create the oil/water emulsions that basically give you the good contact of the oil and water phases; there is always an electrostatic field in these, electric grid" (Testimony of Jerry Weers at 70:14 - 71:1). The background section of the specification of the Nguyen '943 patent further supports this admission by Weers at 1:53 – 67 by explaining this common separation technique.

> Desalting is the resolution of the natural emulsion of water that accompanies the crude oil by creating another emulsion in which about 5 percent relative wash water is dispersed into a desalter vessel containing a parallel series of electrically charged plates. Under this arrangement, the oil and water emulsion is exposed to the applied electrical field. An induced dipole is formed on each water droplet within the emulsion that causes electrostatic attraction and coalescence of the water droplets into larger and larger droplets. eventually, the emulsion resolves into two separate phases—the oil phase (top layer) and the water phase (bottom layer). The streams of desalted crude oil and effluent water are separately discharged from the desalter.

Weers also stated that it was common to add acid to the wash water (Weers' testimony at 123:19 - 124:3).

The only limitation missing from the Patent Owner Admissions is the specific hydroxyl-carboxylic acid required to chelate the metal ions in the crude oil. However, Hickok discloses the extraction of metal ions from gasoline (hydrocarbon phase) using a 5% to 10% by volume amount of a wash water containing a hydroxycarboxylic acid (glycolic acid, malic acid, or lactic acid at 2:64-72). See column 5, lines 38-42. The preferred hydroxyacid is lactic acid as found in claim 2.

It would have been obvious to the person of ordinary skill in the art to have modified the teachings of Patent Owner Admissions by adding a water-soluble hydroxyacid such as lactic acid to the wash water at a pH of 6 or below to the wash water as taught by Hickok in the standard crude oil desalting process as taught in the Patent Owner Admissions in order to improve the efficiency of transferring metal ions from crude oil into the wash water. Thus, claims 1, 17, 26 and 32 are *prima facie* obvious over the Patent Owner Admissions in view of Hickok. New claims 26 and 32 correspond to the original claims 1 and 17, respectively.

The adoption of Ground of Rejection No. 7 was necessitated by the submission of the more complete transcript of the Weers' testimony during the Preliminary Injunction Hearing in H-09-CV-1885.

Ground of Rejection No. 8: Adopted

Claims 1, 17, 26 and 32 of the Nguyen '943 are obvious over **Reynolds** in view of the **Patent Owner Admissions** (Testimony by Dr. Weers in the Transcript from the Preliminary Injunction Hearing on 9/1/09) as set forth in the '1399 request at pages 16 - 18. This rejection has been modified by the inclusion of new claims 26 and 32, which claims parallel original claims 1 and 17. This rejection **is adopted** for the following reasons.

The teachings of Reynolds have already been presented under Ground of Rejection No. 1. The only deficiency of Reynolds is the lack of an explicit teaching to use a mixing valve to create an emulsion between wash water and the crude oil, then to use electrostatic coalescence for the separating the hydroxyacid acid wash water from the crude oil (Reynolds, claim 13). Reynolds does refer to the use of a convention desalter separation method in claim 13 at column 2, lines 59 – 63:

> It is contemplated that the physical separation process is ordinarily to be done in a conventional crude oil desalter, which is usually used for desalting petroleum crudes prior to hydroprocessing.

Furthermore, Reynolds describes using commercial desalters for resolving the emulsion into an aqueous phase and an hydrophobic phase (crude oil) at column 3, lines 38 - 44:

> The ratio of aqueous citric acid solution to hydrocarbon feed should be optimized, with the determination factor being the separation method. Commercial desalters, for example, ordinarily run at 10% or less aqueous volume. Countercurrent extractions may also be used for separation. Effective separations have been does at 50% or more aqueous volume.

Thus, Reynolds suggests that the mixing valve of the desalters is used to create the intensive emulsion comprising the wash water containing the hydroxyacid and the crude oil. Reynolds also suggests using electrostatic coalescence within the desalters to resolved the emulsion.

The Patent Owner Admissions by Weers in his testimony during the Preliminary Injunction Hearing establishes that the commercial desalters all have a mixing valve and electrostatic grid for performing electrostatic coalescence. Weers testified that "In every desalter that I've ever seen there's always a demulsifier; there's always heating going on; there's always a mix valve to create the oil/water emulsions that basically give you the good contact of the oil and water phases; there is always an electrostatic field in these, electric grid" (Testimony of Jerry Weers at 70:14 - 71:1). The background section of the specification of the Nguyen '943 patent further supports this admission by Weers at 1:53 – 67 by explaining this common separation technique.

> Desalting is the resolution of the natural emulsion of water that accompanies the crude oil by creating another emulsion in which about 5 percent relative

> wash water is dispersed into a desalter vessel containing a parallel series of electrically charged plates. Under this arrangement, the oil and water emulsion is exposed to the applied electrical field. An induced dipole is formed on each water droplet within the emulsion that causes electrostatic attraction and coalescence of the water droplets into larger and larger droplets. Eventually, the emulsion resolves into two separate phase—the oil phase (top layer) and the water phase (bottom layer). The streams of desalted crude oil and effluent water are separately discharged from the desalter.

In addition, Weers stated that in the prior art it was commonplace to add acid to the wash water (Weers' testimony at 123:19 – 124:3).

Thus, it would have been obvious to the person of ordinary skill in the art to modify the desalting process of Reynolds by using a conventional mixing valve in a refinery desalter to create an intensive emulsion of the wash water and the crude oil and then resolving this emulsion by using an electrostatic field (i.e., electrostatic coalescence) as taught by Weers' testimony, because most desalters are typically fitted with the standard mixing valves and electrostatic grids. Accordingly, claims 1, 17, 26 and 32 are *prima facie* obvious over Reynolds in view of the Admissions by Patent Owner.

The adoption of Ground of Rejection No. 7 was necessitated by the submission of the more complete transcript of the Weers' testimony during the Preliminary Injunction Hearing in H-09-CV-1885.

Ground of Rejection No. 9: Not Adopted

Third Party Requester No. 2 (Nalco) proposed that claim 9 is anticipated by **Bellos '223** as set forth in the '1399 request at pages 18 - 21. This rejection is <u>not adopted</u> for the reasons set forth below. The Third Party Requester No. 2 did not address this proposed rejection in the Comments after ACP filed 8/22/11.

In the Patent Owner Response of 1/23/12, claim 9 was amended by further defining demulsifier as a "water-in-oil" demulsifier.

Independent claim 9 is shown below.

Claim 9 (Amended). A composition for transferring metals and/or amines from a hydrocarbon phase to a water phase consisting of:
a water-soluble hydroxyacid selected from the group consisting of glycolic acid, C_2-C_4 alpha-hydroxy acids, malic acid, lactic acid, polyhydroxy carboxylic acids, thioglycolic acid, chloroacetic acid, polymeric forms of the above hydroxy-acids, polyglycolic esters, glycolate ethers, and ammonium salt and alkali metal salts of these hydroxyacids, and mixtures thereof;
a mineral acid;
at least one <u>water-in-oil</u> demulsifier;
where the pH of the composition is 6 or below.

The "water-in-oil" phrase is not found in the Nguyen '943 specification per se, but does flow from the single type of emulsion described in the patent when a small amount of wash water is added to a much larger amount of crude oil. Thus, Nguyen '943 is only concerned with water-in-oil emulsions.

In contrast, Bellos '223 is not directed to desalting crude oil, but instead is directed to methods of removing water soluble organics from oil-processed water (Abstract and claim 1). That is the emulsion in Bellos '223 is the reverse of that of Nguyen '943. The demulsifier in Bellos '223 is an <u>oil-in-water</u> demulsifier, not a <u>water-in-oil</u> demulsifier as now cited in amended claim 9.

Accordingly, Bellos '223 does not anticipate amended claim 9 and Ground of Rejection No. 9 is not adopted.

Ground of Rejection No. 10: Not Adopted

Third Party Requester No. 2 (Nalco) proposed that claim 9 is anticipated by **Bellos '532** as set forth in the '1399 request at pages 21 - 24. This rejection is not adopted for the following reasons. Neither Third Party Requester No. 1 or 2 addressed this proposed rejection in the Comments after ACP filed 8/22/11.

In the Patent Owner Response of 1/23/12, claim 9 was amended by further defining the demulsifier as a "water-in-oil" demulsifier.

The phrase "water-in-oil" phrase is not found in the Nguyen '943 specification per se, but does flow from the single type of emulsion described in the patent when a small amount of wash water is added to a much larger amount of crude oil. Thus Nguyen '943 is only concerned with water-in-oil emulsions.

In contrast, Bellos '532 is not directed to desalting crude oil, but instead is directed to methods of removing water soluble organics from oil-processed water (Abstract and claim 1). That is the emulsion in Bellos '532 is the reverse of that of Nguyen '943. The demulsifier in Bellos '532 is an oil-in-water demulsifier, not a water-in-oil demulsifier as now cited in amended claim 9.

Accordingly, Bellos '532 does not anticipate amended claim 9 and Ground of Rejection No. 10 is not adopted.

Ground of Rejection No. 11: Not Adopted

Third Party Requester No. 2 (Nalco) proposed that claim 9 is anticipated by **Bellos '592** as set forth in the '1399 request at pages 24 - 27. This proposed rejection is not adopted for the reasons set forth below. Neither Third Party Requester No. 1 or 2 did not address this proposed rejection in the Comments after ACP filed 8/22/11.

In the Patent Owner Response of 1/23/12, claim 9 was amended by further defining demulsifier as a "water-in-oil" demulsifier.

The phrase "water-in-oil" phrase is not found in the Nguyen '943 specification per se, but does flow from the single type of emulsion described in the patent when a small amount of wash water is added to a much larger amount of crude oil. Thus, Nguyen '943 is only concerned with water-in-oil emulsions.

In contrast, Bellos '592 not directed to desalting crude oil, but instead is directed to methods of removing water soluble organics from oil-processed water (Abstract and claim 1). That is the emulsion in Bellos '592 is the reverse of that of Nguyen '943. The demulsifier in Bellos '592 is an <u>oil-in-water</u> demulsifier, not a <u>water-in-oil</u> demulsifier as now cited in amended claim 9.

Accordingly, Bellos '592 does not anticipate amended claim 9; thus Ground of Rejection No. 11 is adopted.

Ground of Rejection Nos. 1 and 2: Response to Arguments

Patent Owner Argument A(1): <u>Reynolds Does Not Disclose Wash Water</u>

The Patent Owner argues that Reynolds does not disclose a water wash but instead describes mixing a hydrocarbonaceous feedstock (i.e., crude oil) with an "aqueous solution" of hydroxycarboxylic acids or salts thereof (Abstract, 2:5-7). The Patent Owner further asserts that Reynolds' aqueous solution is simply to aid in the handling of the citric acid, which is a solid. The Patent Owner argues that there is no basis for the assumption that the aqueous solution of Reynolds is the same as the wash water of the instant claims (Response to ACP at page 13, line 26 through page 14, line 27).

"The Examiner is correct that Reynolds discloses 'the feedstock to be demetalized is intimately and thoroughly mixed with an aqueous solution of citric acid or its salts (2:5-7) and '[t]he crude or residuum desired to be processed is mixed with an aqueous solution of a hydroxo-carboxylic acid, salts thereof' (2:44-46), but one having ordinary skill in the art would simply

understand that such mixing is to contact the citric acid and its salt with the iron in the crude in Reynold's extraction method--not to form an emulsion. There is no understanding, much less a disclosure or a teaching in Reynolds, of 'washing' crude oil with water as in the Nguyen '943 claim method" (Response to ACP at page 14, line 28 - page 15, line 2).

Examiner's Response to Argument A(1): Reynolds Discloses Wash Water

The Patent Owner argues that Reynolds does not disclose a "wash water" because it does not literally use the phrase "wash water." Contrary to the Patent Owner's assertion, there is no doubt that the "aqueous solution" of Reynolds is equivalent to the "wash water" in instant claim 1 of the Nguyen '943 patent.

The "aqueous solution" of Reynolds and the "wash water" of instant claim 1 each use water as the solvent and a hydroxyacid acid as the solute. The "aqueous solution" of Reynolds and the "wash water" of claim 1 share a common pH of around 6. Finally, the "aqueous solution" of Reynolds and the "wash water" of instant clam 1 are both used to transfer metal ions from crude oil by intimate and thorough mixing to form an emulsion followed by resolution of the emulsion. Accordingly, the "aqueous solution" of Reynolds and the "wash water" of instant claim 1 are chemically and functionally equivalent.

Patent Owner's Argument A(2): Reynolds Teaches Away from the Use of Emulsions

"The Patent Owner argues that the only explicit use of the term "emulsion" in Reynolds is actually a teaching away from the creation of an emulsion. At 3:31-37, Reynolds states:

> As discussed previously, in order for the iron to bind appropriately, to the citric acid, the pH should be above 2 and preferably 5 to 9. One difficulty with the addition of base, however, is the **formation of emulsions, which can interfere with effective separation**. Therefore, the most preferred pH is around 6, especially for naphthenic acid crudes. (Emphasis added.)"

(Response to ACP at page 15, lines 4 – 9.)

Examiner's Response to Argument A(2): Reynolds teaches formation of resolvable emulsions

The person of ordinary skill in the art would understand that the above passage from Reynolds refers to creating stable emulsions of naphthenic acid crudes made worse by adding base. That this passage is a teaching away from only creating such undesirable emulsions is supported by an article cited by the Patent Owner in the Response to the non-final Office action of 8/2/11 at page 45. The Patent Owner stated, "Calcium naphthenate precipitates and emulsion was [sic] noted this same year, 2002, as an increasing problem in S. J. Dyer et al., 'Naphthenate Scale Formation--Examination of Molecular Controls in Idealised Systems,' SPE 6th International Symposium on Oilfield Scale, Aberdeen, UK, 29-30 January 2003." Dyer et al. explains in the "Introduction:"

> Due to the lipophilic nature of calcium naphthenate it will preferentially partition into the oil phase or to the oil—water interface during oil production. This may result in the formation of an emulsion or if the soap concentration exceeds its stability in the oil phase, calcium naphthenate will precipitate. The composition, solution pH, % water cut, the associated production conditions and changes in these parameters during production, all control the potential for the formation of **naphthenate stabilized emulsions** and/or calcium naphthenate scale deposits. (Emphasis added.)

Thus, in the Patent Owner's effort to establish the removal of calcium from naphthenate crudes as a long-felt problem in the art, it becomes clear that the reference in Reynolds to certain undesirable naphthenate stabilized emulsions are made worse by the addition of base (3;31-37).

The Patent Owner's assertion that Reynolds nowhere teaches or suggests the creation of an emulsion is unfounded. Reynolds discloses the implicit creation of an emulsion each time there is a description of mixing an aqueous solution containing a hydroxycarboxylic acid with crude oil or the separation of the two phases into an aqueous phase and a hydrophobic phase (Abstract; 2:44-65; 3:38-43; 3:66 – 4:1; Examples 1 – 4; claims 1 and 13). This interpretation is supported by the traditional definition of an emulsion: "a mixture of two or more liquids that are immiscible" (Wikipedia). The shaking of two immiscible liquids in a separatory funnel forms an emulsion just as surely as a mixing valve in a desalter creates an emulsion. The former emulsion is a temporary emulsion that is easily separated by settling, while the latter intensive emulsion requires the resolving power of electrostatic coalescence. Regardless, both of these mixtures are emulsions. The person of ordinary skill in the art would recognize that an "intimately and thorough" mixing of the aqueous solution with the crude oil feedstock inherently creates an emulsion whether in the laboratory or in a desalter of a refinery (Reynolds; 3:40 - 42, claim 13). Moreover, claim 13 of Reynolds states clearly that a conventional crude oil desalting procedure can be used to separate the two phases. This presumes that the mixing valve is used to create the emulsion of the aqueous solution of the hydroxyacid (wash water) and the crude oil. Dr. Weers has stated under oath that every desalter that he has ever seen possesses electrostatic plates which are used for electrostatic coalescence (Weers' Testimony at 70:14 - 71:1).

Patent Owner's Argument A(3): *Reynolds raises pH instead of lowering as required by the instant claims of Nguyen '943*

*"In Nguyen '943 claim 1 requires 'lowering the pH of the **wash water** to 6 or below' (emphasis added). Reynolds further expressly teaches away from Nguyen '943 because Reynolds pH adjustment occurs through raising the pH to between 5 – 9 and because Reynolds raises only the pH of the aqueous solution, not the pH of the wash water"*

> *The basic process is relatively simple: The crude or residuum desired to be processed is mixed with an aqueous solution of a hydroxo-carboxylic acid, salts thereof or mixtures thereof, preferably citric acid or salts thereof, **and a base for adjusting the pH above 2, and preferably between 5 and 9**. (2:44-49; emphasis added.)*

The only other place in Reynolds where pH adjustment of the aqueous solution is noted (other than the extraction Examples) is at 3:31-33, quoted above, which makes sense only with respect to the aqueous solution in the previous paragraph at 3:26-30:

> *The salt forms of citric acid can be generally formed in situ by the addition of most any strong base, and can be isolated in some cases from the **aqueous solution**, as crystalline salts. The salts are generally more water soluble, and less acidic that the free acid. (Emphasis added.)"*

Examiner's Response to Argument A(3): Critical parameter is final pH rather than the method of arriving at that pH

The Patent Owner argues that Reynolds requires the use of a base to adjust (increase) the wash water to the preferred value of around 6 (3:31-37), whereas the instant claims require the lowering of the pH. This argument has been fully considered but is not deemed persuasive.

It is important to keep in mind that Ground of Rejections Nos. 1 and 2 are obviousness rejections and not anticipation rejections. An anticipatory rejection would require the prior art to disclose the exact steps of claim 1 of the Nguyen '943 patent and nothing beyond. However, in an obviousness rejection this is not the case.

The critical elements of the Nguyen '943 patent are the presence of a hydroxyacid in the wash water and a pH of 6 or below. When Reynolds adds a hydroxycarboxylic acid to water, the pH is lowered by definition. The step of dissolution of the hydroxyacid fully meets the limitation of instant claim 1: "lowering the pH of the wash water to 6 or below." That Reynolds requires using a base to adjust the wash water to the preferred pH of around 6 (3:31-37) does not negate the fact that Reynolds discloses a wash water containing a hydroxyacid at a preferred pH of around 6. In the first example in Reynolds, the pH of the citric acid wash water was adjusted upward to 6 with ammonium hydroxide (3:58-67). While instant claim 1 does not literally permit the adjusting the pH of the wash water containing a hydroxyacid with a base, the closed language of instant claim 1 still encompasses and permits an indirect adjustment with a base such as ammonium hydroxide or an alkali metal hydroxide that yields in solution the "ammonium salt and alkali metal salts of these hydroxyacids." This fact is clearly set forth in the specification of the Nguyen '943 patent at 5:10-17:

> In particular, the definition of water-soluble hydroxyacids includes ammonium salt and alkali metal salts (e.g., sodium and potassium salts, etc.) of these hydroxyacids alone or in combination with other water-soluble hydroxyacids mentioned. Such salts would be formed in the desalter wash water as the system's pH was adjusted with pH adjusters such as sodium hydroxide, potassium hydroxide, ammonia, and the like.

Like instant claim 1, Reynolds teaches adding a hydroxyacid to wash water to adjust the pH to around 6. Thus, the process of Reynolds involves "lowering the pH of the wash water to 6 or below, before, during and/or after adding the composition" as claimed. Reynolds also discloses the use of ammonium hydroxide or alkali metal base to adjust the pH to around 6.

By permitting the addition of salts of hydroxyacids, instant claim 1 indirectly encompasses but does not require this same base adjustment of the pH of the wash water. The only way a carboxylic acid can be transformed in a salt is by the addition of a base. Accordingly, Patent Owner's Argument A(3) is not deemed persuasive.

The Patent Owner has added new claims 26 and 30 - 32 corresponding to original claims 1, 5, 6, and 17. These new claims do not contain the limitation " and ammonium salts and alkali metal salts of these hydroxyacids" in order to further distinguish from the invention of Reynolds. However, new claims 26 and 30 – 32 are also deemed to be obvious over Reynolds in view of Hart or SU '520. The open language "comprising" in instant claim 1 permits the inclusion of other components including the salts of hydroxyacids.

The critical feature of the instant invention is the use of a water wash containing at least one hydroxyacid at a pH of 6 or below to desalt crude oil. Reynolds also teaches the use of a water wash (i.e., aqueous solution) containing a hydroxyacid at around pH 6 in order to desalt crude oil (3:35-37). It does not matter whether one lowers the pH to 6 or adjusts the pH with base to 6 so long as the final pH of the aqueous solution of a hydroxyacid is around 6. The result is the same. The Patent Owner has presented no evidence to refute this position.

Patent Owner Argument B(1): <u>Reynolds Only Discloses Mixtures and Not Emulsions</u>

"Reynolds describes his process at 2:44-52, again:

> *The basic process is relatively simple: The crude or residuum desired to be processed is mixed with an aqueous solution of a hydroxo-carboxylic acid, salts thereof or mixtures thereof, preferably citric acid or salts thereof, and* ***a base for adjusting the pH above 2, and preferably between 5 to 9.*** *The iron is readily-bound or chelated to the acid ion. This iron/hydroxo-carboxylate complex is ionic and is therefore soluble in the* ***aqueous phase*** *of the* ***mixture****.*

> *The two phases, the aqueous and the **crude or hydrocarbonaceous phase**, are separated or permitted to separate, and the **aqueous solution** is removed. (Emphasis added.)*

*The result of mixing the crude or residuum is explicitly identified as a mixture, not an emulsion. The mixture is specified as having two different phases: an aqueous phase and a hydrocarbonaceous or crude phase, and the process works without creating an emulsion. An **aqueous solution** was mixed with the crude to form a **mixture** and the **aqueous solution** was separated from the **mixture** and removed. Reynolds does not disclose an emulsion—only simple mixtures. Indeed, the fact that the Reynolds '463 patent does not disclose an emulsion—only simple mixtures. Indeed, the fact that Reynolds '463 calls for mixing but teaches away from an emulsion demonstrates that they are not the same. Again, Reynolds' teachings are consistent with an extraction method, not a refinery desalting process."*
(P.O. Response to ACP at page 17, lines 1 - 18.)

Examiner's Response to Argument B(1): Mixtures in Reynolds are emulsions

This same argument has already been addressed thoroughly above under Examiner's Response to Argument A(2).

Patent Owner's Argument B(2): Separating mixtures is not resolving created emulsions

*"The Patent Owner additionally respectfully submits that the Nguyen '943 claim 1 also requires: '**resolving the emulsion** into hydrocarbon phase **and an aqueous phase** using electrostatic coalescence, where at least a portion of the metals and/or amines are transferred to the aqueous phase' (emphasis added, 19:13-19). As noted above in the discussion of Reynolds at 2:52-55, Reynolds does not disclose, hint or teach at creating or resolving an emulsion, only separating (or permitting to separate) 'the aqueous solution' that formed a mixture." (P. O. Response to ACP at page 17, lines 19 – 25.)*

Examiner's Response to Argument B(2): Reynolds discloses implicit emulsions

The Patent Owner mischaracterizes the mixtures disclosed by Reynolds as non-emulsions. By definition, emulsions are mixtures of two immiscible liquids. Water and crude oil are immiscible liquids. Therefore, mixture of water and crude oil form emulsions. However, the emulsion of Reynolds will separate upon settling. The emulsion created in desalters with a

mixing valve are intensive emulsions that will not settle out by themselves but require electrostatic coalescence to achieve separation.

It would have been obvious to the person of ordinary skill in the art to incorporate the metal extraction process of Reynolds into a refinery desalting process by mixing the aqueous solution containing a hydroxyacid with crude oil with the aid of a mixing valve and then resolving the emulsion by electrostatic coalescence because Reynolds teaches that the process is "ordinarily to be done in a conventional crude oil desalter" (2:59-65). Hart establishes that such a conventional crude oil desalter contains a mixing valve and electrostatic plates to permit electrostatic coalescence (2:43-52).

Patent Owner's Argument B(3): Unlike Nguyen '943, Reynolds discloses addition of solvent

"Reynolds at 3:58 – 62 discloses: 'In laboratory trials—the results of which are detailed in the tables below--the amount of San Jaoquin Valley vacuum residuum (51 ppm Fe) ***was dissolved in toluene to give a workable viscosity****, and was mixed with a 10% to 50% aqueous volume of the citric acid solution.' (Emphasis added.) Adding a hydrocarbon solvent such as toluene that has a viscosity less than the hydrocarbon being treated (hydrocarbonaceous feedstock in Reynolds) is done so it may be more easily handled, for instance, pumped. However, the Nguyen '943 claims do not contemplate the need or presence of a hydrocarbon or a hydrocarbon solvent. While claim 17 recites that the composition may additionally comprise 'a water or alcohol solvent,' neither of these components are a hydrocarbon solvent (e.g., toluene) as taught by Reynolds. Thus, for this additional reason, Reynolds not only cannot teach or suggest the Nguyen '943 claimed invention, but in fact* ***teaches away from*** *the claimed invention. (P.O. Response to ACP at page 17, line 27 to page 18, line 4.)*

Examiner's Response to Argument B(3): Reynolds claimed process does not require solvent

The Patent Owner attempts to limit the disclosure of Reynolds to the examples only and ignores the actual claimed invention of Reynolds. Reynolds' claims do not require the addition of a hydrocarbon solvent to the hydrocarbonaceous feedstock (claims 1 – 13). The only reason

that it was necessary to add a solvent was the high viscosity of the San Joaquin Valley residuum. The addition of a solvent is a more convenient way to reduce the viscosity of the residuum in the laboratory that heating the feedstock to 180°F to 300°F as done in actual refinery desalters. See claims 9, 10 and 13 of Reynolds and Hart at column 2, lines 47-49. As explained in claim 1 of Reynolds, the hydrocarbonaceous feedstocks include not only crude petroleum but also "atmospheric or vacuum residuum, solvent deasphalted oil derived from these crudes or residua, shale oil, liquefied coal, and tar sand effluent," which have varying viscosities.

Patent Owner's Argument B(4): Reynolds disclosure is insufficient and inapplicable

*"When reviewing Reynolds as a whole, it is clear that most of the focus is on aqueous extraction (for instance, the Examples and claims are almost exclusively directed to aqueous extraction) and that Reynolds likely only supposed his method might have some applicability to desalting without having any idea if or how such a method would work. It remained for the Nguyen '943 inventors to discover not simply the Markush group of effective water-soluble hydroxy acids (Nguyen '943 at 19:1-8) but also that at least one water-soluble hydroxy acid is to be added to the wash water, lowering the pH of the wash water to 6 or below, adding the wash water to the crude to create an emulsion and resolving the emulsion into a hydrocarbon phase and an aqueous phase (**not** Reynolds' 'aqueous solution'). It is the combination of all of the elements of Nguyen'943 claim 1 that constitutes an entire, total invention that works together—which is not obvious from the mere combination of Reynolds' insufficient disclosure of certain hydroxyo-carboxylic acids useful in an extraction process together with Hart or SU '520." (P.O. Response to ACP at page 18, lines 5 – 25.)*

Examiner's Response to Argument B(4): Reynolds' disclosure is sufficient and applicable

The Patent Owner asserts that Reynold's describes an aqueous extraction procedure for removing iron from crude oil to an aqueous solution is entirely different from the method of Nguyen '943 for transferring metals from crude oil to wash water. For a clearer comparison of the two processes, the following table clarifies the similarities:

Reynold's Process	Nguyen '943 Process
Extraction process for transferring iron and calcium from crude oil to aqueous solution (i.e., wash water)	Extraction Process for transferring metals from crude oil to wash water
Uses aqueous solution containing a hydroxycarboxylic acid (malic acid or lactic acid) at around pH 6	Uses aqueous solution containing a hydroxycarboxylic (malic acid or lactic acid) at pH 6 or below
Mixes aqueous solution with crude oil to form temporary emulsion	Uses conventional mixing valve to mix wash water and crude oil to form intensive emulsion
Resolves emulsion by settling OR uses commercial desalters and conventional mixing and separation desalter (2:58-65)	Resolves emulsion by electrostatic coalescence

Every refinery desalter contains a mixing valve, a heater, and electrostatic plates and adds an acid to the wash water (Weers' Testimony at 70:14 and 71:1) Therefore, the only "innovation" of the Nguyen '943 invention is the use of specific hydroxyacids in the wash water. Two of these hydroxyacids—malic acid and lactic acid--are also taught by Reynolds (claim 5; 3:11-15). The preferred pH of Reynolds (around pH 6) falls squarely within the claimed pH of the wash water of 6 and below of Nguyen '943. The Patent Owner argues that it would not have been obvious to have adapted the extraction of Reynolds exemplified in the laboratory into the traditional desalter where a mixing valve creates an intensive emulsion with the wash water and the crude oil and the emulsion is resolved by electrostatic coalescence. This argument is not substantial because Reynolds teaches the use of this extraction process for adaptation in a desalter (2:57-65; claim 13) and is further supported by the teachings of Hart

which uses a similar technology in a desalter containing a mixing valve and electrostatic electrodes.

Patent Owner's Argument B(5): Nguyen '943 recites both lowering the pH of the wash water and creating an emulsion - Reynolds discloses neither because it is primarily extraction

"In Nguyen '943 claim 1, 'lowering the pH of the wash water to 6 or below' coexists with the next language in the claims of 'adding the wash water to crude oil to create an emulsion.' These characteristics exist ***together*** *in the Nguyen '943 claim 1, along with other elements because the Nguyen '943 discovered these elements work together for a successful,* ***refinery desalting process****. Reynolds instead teaches that they do not co-exist – that one having ordinary skill in the art would understand from the above-excerpted paragraph from 3:31-37 that one should not form an emulsion, such is done so by the addition of base and/or a pH above 6 or 'around 6.' The Patent Owner respectfully submits that like much of the teaching in Reynolds, this portion is particularly instructive for an extraction process, however, the Nguyen '943 claims are instead directed to a refinery desalting process" (P.O. Response to ACP at page 18, line 26 to page 19, line 7.)*

Examiner's Response to Argument B(5): Reynolds discloses lowering the pH of the wash water and creating an emulsion

These two repetitive issues have already been addressed thoroughly by the examiner under Arguments A(2), A(3), B(1) and B(2).

Briefly, Reynolds clearly teaches lowering the pH by adding a hydroxyacid to water (Example 1 – 4) and discloses creating emulsions by intimately and thoroughly mixing the wash water with the crude oil (2:5-12). Some of the emulsions disclosed by Reynolds may be readily separated overnight in the laboratory extractions. However, Reynolds further teaches the creation of emulsions in a desalter that are resolved by conventional desalter techniques (claim 13; 2:59-65) and further supported by the disclosure of Hart (2:43-52).

Patent Owner's Argument B(6): Mixing an aqueous solution with crude oil does not inherently create an emulsion

"At the bottom of page 22 of the ACP the Examiner contends: 'Mixing an aqueous solution with crude oil inherently creates an emulsion as required by claim 1 of the Nguyen '943 patent.' " (P.O. Response to ACP at page 21, lines 6-7.)

"The Examiner correctly quotes Reynolds at the indicated sections, but incorrectly concludes that such mixing gives 'by definition' an emulsion. Instead, such mixing gives what the Examiner says Reynolds gives, namely, 'two phases which requires separation' (Emphasis added.) There is nothing in Reynolds that indicates the mixing or shaking was severe enough or of a character to generate water droplets dispersed in oil as in a water-in-oil emulsion." (P.O. Response to ACP at page 21.)

Examiner's Response to Argument B(6): Reynolds implicitly discloses temporary emulsions that will settle overnight

Reynolds discloses the formation of simple emulsions that can be separated by overnight settling (Examples 1 - 4). These laboratory experiments are only meant to establish proof of principle. Reynolds further discloses the use of this information in the formation of water-in-oil emulsions created in desalters that use mixing valves. This is clear from column 2, lines 52-65 and claim 13 of Reynolds that states that separation of the aqueous from the crude oil is accomplished by a conventional crude oil desalting process. It is well-known that conventional desalters use electrostatic coalescence. (Hart, 2: 43 – 48 ; Nguyen '943, 1:54-67; and Weers' Testimony at 70:14 – 71:1). This position is completely consist with the "intimately and thoroughly mixing" of the aqueous solution containing a hydroxyacid and crude oil (Reynolds, 2:5-9).

Patent Owner's Argument C: Reynolds and Hart differ about creating an emulsion and lowering the pH of the of the wash water to 6 or below and where the acid is to be added.

Hart is at odds with Reynolds since Hart teaches forming a water in oil emulsion and wash phase pH of from 6 – 11. Hart teaches adding oxalic acid or citric acid directly to the liquid hydrocarbon. One having ordinary skill in the art would not know which of Hart's teachings to use without improperly using the Nguyen '943 claims as a blueprint. (P.O. Response to ACP at pages 22 - 25.)

Examiner's Response to Argument C: Hart discloses the use of electrostatic coalescence to resolve an emulsion of a water phase containing a hydroxyacid from the crude oil phase.

The Patent Owner argues, in effect, that Reynolds cannot properly be combined with Hart. This argument is unfounded. Hart is required only for the well-known teaching that commercial desalters contain mixing valves and electrostatic grids. Hart discloses the extraction of iron from crude oil using hydroxyacids as the chelating agents. Hart further discloses the addition of the hydroxyacid directly to the crude oil as well as adding a wash water containing said hydroxyacid (6:58 to 7:40). Hart further discloses the resolution of an emulsion in a desalter using electrostatic coalescence (2:43-52; 6:58 - 7:40). Therefore, Hart establishes that commercial, conventional desalters are typically used to create an intensive emulsion with a mixing valve following by resolution of the two phases by electrostatic coalescence. Such standard use of desalters is further supported by the background section of the Nguyen '943 patent (2:53-67) and by the testimony of Weers (Weers' Testimony at 70:14-70:1).

Patent Owner's Argument D: Claim 1 of Nguyen '943 does not permit pH adjustment with base

The Patent Owner asserts that the invention of Nguyen '943 is distinguished from that of Reynolds because claim 1 of Nguyen '943 only permits the lowering of the pH of water by the hydroxyacid while Reynolds lowers the pH of the water with a hydroxyacid but then raises the pH with a base. This addition of base is not permitted by the invention of Nguyen '943 because

of the closed language "consisting of" with respect to the steps in the method. (P.O. Response to ACP at pages 25 and 26.)

"In summary, the pH disclosed in Nguyen '943 claim 1 and the pH disclosed in Reynolds are obtained in different ways because they are different methods. One having ordinary skill in the art reviewing Reynolds would know that a separate base is necessary—as explicitly taught therein. Such one attempting to improve Reynolds would still expect a base to be used since that is what Reynolds explicitly teaches, particularly since Hart also permits the pH to be in the basic ranges. In contrast, there is no recitation of a base in the Nguyen '943 claim 1." (P.O. Response to ACP at page 26, lines 25 - 30.)

Examiner's Response to Argument D: The critical parameter is the final pH and not the process of arriving at the pH

This same issue has been addressed in the rebuttal of argument A(3). Briefly, the Patent Owner argues that that by adjusting the pH upward to 6 with base, that the Reynolds method is distinguished from that of Nguyen '943. This would be a decisive argument only if the rejections under discussion were anticipation rejections--but they are not. Ground of Rejection Nos. 1 and 2 are obviousness rejections. The two critical parameters of the Nguyen '943 process are the presence of a hydroxyacid in the wash water and a pH of 6 or below in the wash water. Reynolds discloses both of these critical features. Therefore, the method of Reynolds renders the method of Nguyen '943 obvious. The Patent Owner has not provided any objective evidence that the raising of the target pH of 6 with base taught by Reynolds results in changes of the metal extraction properties of the wash water at pH 6 containing the same hydroxyacid such as malic acid or lactic acid (claim 5 of Reynolds).

Patent Owner's Argument E: Claim 1 of Nguyen '943 requires lowering the pH of the wash water to 6 or below; Reynolds and Hart permit an alkaline pH

In the typical desalters, the optional pH operating conditions are maintained at from about 6—10 in order to retard corrosion and enhance emulsion resolution (Hart at 2:43-47).

The pH of the wash water in Reynolds is above 2, preferably between 5 to 9 (2:44-49). This difference in the acceptable pH ranges indicates a different chemistry is involved in Reynolds and Hart as contrasted with the method of claim 1 of the Nguyen '943 patent. For this reason alone, the Patent Owner respectfully submits that the Nguyen '943 claims are not obvious from the combination of Reynolds and Hart. For this reason, taken alone and especially when taken together with the other distinctions established herein that Reynolds teaches away from the claimed invention. (P.O. Response to ACP at pages 27 and 28.)

Examiner's Response to Argument E: <u>Reynolds prefers pH 6 which overlaps with 6 or below</u>

The Patent Owner argues that because Reynolds discloses a pH range of "5 to 9" versus the claimed "6 or below" establishes that the chemistry of the processes taught by Reynolds is different from the chemistry claimed by Nguyen '943. Similarly, Hart teaches a higher pH range of 6 – 10 in order to retard corrosion in the desalter. This argument has been fully considered but is not deemed persuasive.

First of all, both Reynolds (3:35-37 and 62-66) and Hart disclose a preferred pH of 6 (6:67-68). This value falls directly within the required range of 6 or below. Furthermore, "[i]n the case where the claimed ranges 'overlap or lie inside ranges disclosed by the prior art' a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)." See MPEP §2144.05. At pH 6 there can be no question that the chemistries are the same: same hydroxycarboxylic acid (malic acid or lactic acid) in an aqueous solution that extracts or transfers metal ions (iron and calcium; Reynolds at column 3, lines 22 - 25) from crude oil.

Patent Owner's Argument F: <u>Reynolds teaches adding a base; the claims recite removing a base</u>

"While 'There is no dispute that Reynolds teaches the transfer of iron (a metal) from a hydrocarbon phase to a water phase' (ACP p. 29), the Patent Owner respectfully submits that

Reynolds does so by a different, extraction process and respectfully traverses the Examiner statement that '. . . Reynolds reads on claim 1 regardless of whether it teaches transfer or removal of amines.' Reynolds does not teach or suggest many elements of claim 1 including using a wash water, lowering the pH of the wash water to 6 or below, adding the wash water to crude oil to create an emulsion and resolving the emulsion. Reynolds' method is over-whelmingly an aqueous extraction method and ineffectively teaches a desalting process and does not disclose, teach or suggest the total method recited in claim 1." (P.O. Response to ACP at page 29, lines 16 – 24.)

Examiner's Response to Argument F: Reynolds will also transfer metal ions and/or amines

It is important to remember that Ground of Rejections 1 and 2 are obviousness rejections -- not anticipation rejections. The Patent Owner continues to assert that because the procedure of Reynolds is an extraction method, this somehow distinguishes instant claim 1 from Reynolds. However, the Patent Owner has failed to explain in what way the method of instant claim 1 is not an extraction method since it "extracts or transfers" metal ions from crude oil. Whatever the process of instant claim 1 extracts from crude oil will also be extracted or transferred into the aqueous solution of Reynolds that contains the same hydroxyacid (malic acid or lactic acid) at the preferred pH of around 6.

Reynolds first lowers the pH of the water with the addition of the hydroxyacid, just as required by claim 1 of the Nguyen '943 patent. Reynolds permits but does not require in the claimed invention, increasing the pH of the wash water with a base (e.g., ammonium hydroxide) up to around 6, the preferred pH. However, the critical issue is the final pH of the wash water and not the route to that pH.

Instant claim 1 reads in-part "A method of transferring metal ions and/amine from a hydrocarbon phase to a water phase . . . ." The amine to which the Patent Owner refers in the

alternative is an organic amine. At pH of 6 or below organic amines are positively charged and so will migrate into the aqueous phase. This process is not limited to that claimed by Nguyen '943 because the aqueous phase of Reynolds containing a hydroxyacid such as malic acid or lactic acid at pH 6 will necessarily and inherently extract both metal ions and the same organic amines as described in instant claim 1 because the aqueous solutions are equivalent, same solvent (water), same solute (hydroxyacid) and same pH (6).

Patent Owner's Argument G: *Reynolds teaches away from electrostatic coalescence*

"The Examiner admits that 'Reynolds differs from the instant claim in not disclosing the use of electrostatic coalescence to resolve the emulsion.' Reynolds does disclose that in one embodiment 'the physical separation process is ordinarily to be done in a conventional crude oil desalter (2:59-63), yet in the three places that Reynolds says a desalter may be used, he also states that ***any*** *separation process, e.g.,* ***countercurrent extraction****, may be used. In 2:63-65, Reynolds discloses 'The separation may be done by* ***any separation process****, however, and may include* ***countercurrent extraction****." In 3:42-43 Reynolds discloses: '****Countercurrent extraction*** *may also be used for separation' (all emphasis added). Indeed, as previously established Reynolds is overwhelmingly concerned with an extraction method and does not teach an effective desalting method." (P.O. Response to ACP at page 30, lines 3 – 11.)*

Examiner's Response to Argument G: Countercurrent disclosure does not negate conventional crude oil desalting procedure

The Patent Owner minimizes the disclosure of Reynolds regarding the process of Reynolds being accomplished in a conventional desalter just because Reynolds also teaches the use of countercurrent extraction. A reference is good for all that it teaches and not just preferred embodiments.

Furthermore, the person of ordinary skill in the art would understand the electrostatic coalescence is the predominant alternative to countercurrent procedures (P.O. Response to

ACP at pages 32 – 33). Since every desalter contains a mixing valve and electrostatic plates as attested by the inventor, Dr. Weers (Weers' Testimony at 70:14 – 71:1), the person of skill in the art would find electrostatic coalescence technique to be obvious whenever countercurrent separation is disclosed or not (P.O. Response to ACP at pages 32 - 33). It would have been obvious to the person of ordinary skill in the art to use the process for extracting iron and calcium using a hydroxo-carboxylic acid as described by laboratory examples in a conventional, commercial desalter as suggested by Reynolds and supported by Hart (2:43-52) and by Weers' testimony (Weers' Testimony at 70:14 – 71:1). There is no sound scientific reason that the use of the Reynolds' iron and calcium extraction procedure using a hydroxyacid (malic acid or lactic acid) at pH around 6 would not function in a traditional desalter.

Patent Owner's Argument H: *<u>Reynolds is directed to an extraction method rather than to a refinery desalting process</u>*

"As previously established, the Reynolds Examples only relate to an extraction process, which is the overwhelming focus of Reynolds. Please see section A(5) above. Reynolds does not apply his method to a refinery desalting process and thus does not and cannot teach anything about it.

At the top of page 31 of the ACP the Examiner noted 'The Patent Owner argues that Reynolds is not directed to a process in a refinery,' and simply asserts that Reynolds' experimental section demonstrates that the Reynolds method was intended for use in a refinery, when in fact it only concerns an extraction process that has nothing to do with a refinery. The Examples use a vacuum residuum, which is not an emulsion. Vacuum residuum is made by heating atmospheric resid to 650 – 700° F under a vacuum which strips out all of the water. No emulsion is created since the citric acid solution and the oil mixture are simply shaken (3:68) and 'allowed to separate' (4:1). No electrostatic coalescence was taught as useful.

Further, Reynolds' Summary at 2:9-12 is unusual as it mentions the 'The aqueous phase and the hydrocarbon phase are separated, and the hydrocarbonaceous feedstock is then available for hydroprocessing.' A refinery desalter is typically located in front of the crude distillation unit rather than directly in front of some hydroprocessing unit, like a hydrotreater. Reynolds sound like a separation process rather than a refining desalting process (no mix valve, no emulsion creation, different laboratory test methods and different separation times) and it is

used in a different location (in front of a hydrotreater rather than a crude unit) and on different hydrocarbons (Nguyen '943's crude oil; Reynolds' feedstocks to a hydrotreater)."
(P.O. Response to ACP at page 31, lines 8 – 26.)

Examiner's Response to Argument H: Reynolds in combination with Hart renders obvious the use of the method of Reynolds in desalter

In Argument H the Patent Owner is attacking only the Reynolds reference while the rejection is based upon the obviousness of Reynolds in view of Hart. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The Patent Owner has not presented any evidence that the extraction process of Reynolds would not function to transfer metals and/or amines from crude oil into the aqueous phase. The underlying extraction principle and chemistry of the Reynolds method and that claimed by Nguyen '943 are met when the pH of the wash water is 6. Furthermore, the method of claim 1 of Nguyen '943 is rendered obvious over Reynolds in view of Hart.

Patent Owner's Argument I: Even if Reynolds is directed to desalting, desalting may be accomplished without electrostatic coalescence

"As evidence that a desalting process does not per se require electrostatic separation, the Patent Owner respectfully directs the Examiner's attention to the attached I. M. Alatiqi et al., "Economic Feasibility of Crude Desalting With Multistage Agitated Extractors," SPE 15712, Presentation at Fifth Middle East Oil Show, Manama, Bahrain, March 7 – 10, 1987, which is contemporaneous in time with Reynolds. The Abstract is:

> *Desalting of crude oil for processing is related to environment protection and corrosion problems. Spherical, vertical and horizontal desalters and electrodehydrators have been used for desalting of crudes, with a considerable processing cost.* ***The crude oil contains fine globules of brine***

> ***that remain in the oil. Natural surfactants are absorbed on the surface of these globules. These surfactants are emulsifiers that form strong hydrophobic films which can be broken up by mechanical agitation and countercurrent flow of the crude oil and water. Crude oil desalting is particularly difficult when the oil contains large amounts of resins and asphaltenes, which gives stable emulsion and persists gravity separation. However, counter-current liquid extraction columns make gravity separation much easier. Agitated extraction columns require smaller size, operate at lower temperature, can handle viscos (sic viscous) crude, operate counter-currently with high mass transfer rate, high efficiency, and large throughput with reduced operational cost. The process is much feasible and desirable with substantial reductions in the quantity of fresh water and thermal energy*** *(Emphasis added.)*

This presentation about desalting has similarities to Reynolds in that it favors countercurrent extraction methods instead of 'electrodehydrators' and further it recommends the former because of a cost analysis presented in Table I Cost Comparison (below). Please also note from the above except the teaching that mechanical agitation (e.g. mixing) can break up the strong hydrophobic films' and thus help ***resolve*** *the emulsions. There is no mention of electrostatic coalescence. Please see the section 'Cost Reduction' bridging pages 178 - 179. (footnotes omitted, emphasis added.)*

> *<u>COST REDUCTION</u>*
>
> *The application of liquid-liquid extraction for desalting in agitated contactors reduces the processing cost significantly compared to electrostatic dehydration process. The electrostatic dehydration is selected because it is the one that is commonly used in crude oil desalting and it is claimed to be efficient and economic. Bergshtein, N.V. 1983. In the electrostatic process the crude oil is preheated, passed to the process fired heater where the crude is heated to the required temperature, and finally to the desalter unit. There are two desalting vessels with a mixing valve to provide intimate contact of the emulsion. Each desalting vessel contain a pair of metal electrodes to maintain a high voltage electrical field, Donald R. 1978.*
>
> ***Experience with agitated columns lead [sic] to the belief that they could be used efficiently for crude oil-salt separation."***
>
> *(P.O. Response to ACP at page 32, line 5 to page 33, line 9.)*

. . . . The ALATIQI article makes it clear that desalting crude oil may be accomplished without electrostatic coalescence, such as by countercurrent extraction, the aqueous extraction method that Reynolds focuses on. (P.O. Response to ACP at page 33, last three lines.)

Examiner's Response to Argument: Desalting of crude oil may be accomplished by electrostastic coalescence or countercurrent processes

The Patent Owner argues that Reynolds appears to be primarily directed to the use of countercurrent separation techniques instead of electrostatic coalescence. This argument has been fully considered but is not deemed persuasive.

Even if Reynolds were primarily concerned with the use of a countercurrent process for the separation of the aqueous phase from the hydrocarbon phase, Reynolds still clearly suggests the use of traditional desalting separation techniques, which is electrostatic coalescence. This is taught in Reynolds at column 2, lines 59 – 65:

> It is contemplated that the physical separation process is ordinarily to be done in a conventional crude oil desalter, which is usually used for desalting petroleum crudes prior to hydroprocessing. The separation may be done by any separation process, however, and may include countercurrent extraction.

This same teaching of using any conventional crude oil desalter is also found in claim 13 of Reynolds, "The method as claimed in claim 1 where said separating is performed by a conventional crude oil desalting process or countercurrent extraction." Thus, Reynolds implicit teachings of the use of electrostatic coalescence cannot be ignored even though counter-current separation is also described. Furthermore, Hart clearly teaches the use of electrostatic coalescence to separate the crude oil phase from the aqueous phase (wash water) containing a hydroxyacid (citric acid) and the chelated metal ions (Abstract, 2:43-52; claims 1, 7 and 17).

The citation of the ALATIQI article comparing the costs of electrostatic coalescences versus countercurrent separation establishes that these two separation techniques are functionally interchangeable. Consequently, the person of ordinary skill in the art reading a

reference emphasizing the use of countercurrent technology in desalting crude oil, would also immediately recognize and find obvious the alternative separation method--traditional electrostatic coalescence as taught by Hart. There is no evidence of record that a separation chemistry used in one separation technique cannot be used equally in the other separation technique. Thus, the ALATIQI article actually reinforces the obviousness of the use of the extraction chemistry described in Reynolds in a traditional electrostatic coalescence process.

Patent Owner's Argument J: *Emulsions may exist to be separated without separate creation*

"The Patent Owner further respectfully submits that it may be seen from ALATIQI Abstract that crude oil may already be in the form of a stable natural emulsion that is to be separated by an extraction method such as ALATIQI and by Reynolds without creation of an emulsion of crude oil and wash water in a refinery desalting process (Abstract). Again, Reynolds does not disclose, teach or suggest creating an emulsion as recited by the Nguyen '943." (P.O. Response to ACP at page 35, lines 2 – 6.)

"The Patent Owner respectfully submits that one having ordinary skill in the art viewing Reynolds which teaches against forming an emulsion and does not teach that electrostatic coalescence may be useful or preferable therein, in fact teaches that countercurrent extraction is more suitable than a refinery desalting process since, as established above, Reynolds is overwhelmingly focused on extraction." (P.O. Response to ACP at page 36, lines 3 – 7.)

"Chemistry is largely empirical and there is frequently great difficulty predicting precisely how a given compound will behave; and that although analogy is useful, organic chemistry is essentially experimental and results are often uncertain and unpredictable." (P.O. Response to ACP at page 36, lines 14 – 16.)

The Patent Owner again respectfully submits that a prima facie case of obviousness rejection has not been established based on Reynolds. (P.O. Response to ACP at page 36, last full sentence.)

Examiner's Response to Argument J: Metal extraction chemistry of Reynolds is applicable for use in desalter with electrostatic coalescence

There is no logical way that Reynolds does not create a temporary emulsion by mixing intimately and thoroughly the aqueous solution (i.e., wash water) containing a hydroxyacid

(citric acid, malic acid or lactic acid) with a crude oil feedstock. Otherwise there would be no need for the two phases to settle overnight. Moreover, the Patent Owner has provided no evidence (only argument) that the extraction chemistry of using a hydroxyacid (including malic acid and lactic acid as designated in claim 5) at pH around 6 would not work in a desalter with a mixing valve and electrostatic electrodes. Finally, Reynolds teaches as much at column 2, lines 43 - 52 and claim 13. The art recognized, traditional option for metal extraction from crude oil at a refinery other than countercurrent is electrostatic coalescence. This fact is reinforced by Hart as well as by ALATIQI et al. Therefore, claims 1, 5, 6, 17, 26 and 30 - 32 of the Nguyen 943 patent are *prima facie* obvious over Reynolds in view of Hart or SU '520.

Patent Owner's Argument K: *Secondary considerations of non-obviousness*

The Patent Owner argues that evidence of non-obviousness is established by commercial success, long felt need in the art met by the invention, and by copying by others.

1. EXCALIBUR™ Technology is embodiment of claims of Nguyen '943

The Weers Declaration confirms that that EXCALIBUR technology is an exact embodiment of claim 1 of the Nguyen '943 patent (Weers Decl. at page 5).

2. Praise by others

"The Patent Owner respectfully submits that the Examiner misinterpreted the Zurlo article discussed on pages 49 - 50 of the 1/23/12 Response. The sentence, 'Work of the past 20 years has shown the most effective method to maximize metal removal in the desalting process is to effect a transfer of the metals from the hydrocarbon phase to the water phase utilizing water soluble hydroxyacids' was cited to show praise by others for the use of hydroxyacids, which is the general approach used by the Nguyen '943 inventors, but as the Patent Owner noted, 'it is unknown exactly which hydroxyacids are being referred to.' In fact, Zurlo explicitly references Hart in footnote 5 on page 1, after 'Iron Removal Capabilities.' Betz Laboratories initiated work in the 1908's [sic] to remove iron from various oil streams to minimize the impact on finish products.[5] Thus, Zurlo's Metal Removal Aids are likely oxalic acid and citric acid of Hart et al. The Metal Removal Aids could be the hydroxycitric acid used in the Reynolds patent which issued a bit over 20 years from the Zurlo article—the same acid as Hart. The Patent Owner emphatically did not admit that its invention covers a process disclosed 13 years before the

Nguyen '943 invention because the other elements of Nguyen '943 claim 1 are not noted, and in particular the particular hydroxyacid used at which point in time is not detailed by Zurlo." (P.O. Response to ACP at page 48, lines 1 – 16.)

3. Commercial Success and Market Share

Weers states in his declaration that Baker Petrolite "has developed approximately a 95% market share in the United States and worldwide for both the processing of crude oil with high calcium concentrations and the processing of crude oil with high amine concentrations through the use of the Nguyen '943 patent" (page 7). Furthermore, Baker Petrolite has successfully treated more than 200,000,000 barrels of Doba crude oil in the United States using the Nguyen '943 patented method. (P.O. Response to ACP at page 48, line 17 through page 49, line 4.)

4. Critical Feature of Nguyen '943 is not taught by Reynolds

"On page 43 of the ACP the Examiner contents that 'the Patent Owner underscores the obviousness of the invention because Reynolds also discloses this specific aspect of the claimed invention [use of hydroxyacid],' and that 'the Patent Owner cannot use secondary considerations to demonstrate nonobviousness where commercial success" 'arose from features of the system found in the prior art.' " As established above, Reynolds, alone or together, does not disclose the Nguyen '943 claims, understood as a whole. Reynolds lacks at least wash water, lowering the pH of the wash water to 6 or below, adding the wash water to crude oil to create an emulsion and resolving an emulsion. The EXCALIBUR™ Technology, established by Dr. Weers in his Declaration as an exact embodiment of claim 1 of the Nguyen '943 patent, is not the same as or prima facie obvious from Reynolds especially taken alone, and even when combined with Hart and SU '520." (P.O. Response to ACP at page 49, lines 6 - 16.)

5. Long-felt need was not satisfied by others

Chevron gave Nalco two opportunities to test their method for removing calcium from Doba. Both times Nalco's method, which used polyacrylic acid and maleic acids according to US Patent No. 7,399,403, failed (Weers Declaration at page 6, last sentence through page 7, line 18). (P.O. Response to ACP at page 49, line 17 through page 51, line 30.)

6. Examiner misinterpreted claim 1 as not permitting an emulsion breaker and a scale inhibitor

Claim 1 encompasses the inclusion of a demulsifier (emulsion breaking chemical) and a scale inhibitor. A scale inhibitor has nothing to do with desalting. Adding a demulsifier is a common step. In Petroleum Refining a demulsifier may be added in a similar place to treat any emulsion, such as the more stable emulsions of heavy naphthenic crudes. Furthermore, Dr. Weers in his attached Declaration establishes that the use of EXCALIBUR™ to remove calcium or amines from crude oil does not require additional demulsifiers or calcium scale inhibitors to be added to the standard refinery desalting process. (P.O. Response to ACP at page 52, lines 7 - 15.)

"While the diagram shows that an emulsion breaking chemical or demulsifier, can also be added to the crude oil stream, demulsifiers are a common part of the desalting process and can be added to either the crude oil or the wash water stream" (page 6). Dr. Weers further notes that the diagram is only an 'Example Excalibur Technology Application' and that not every embodiment of all of the claims of Nguyen '943 are shown in the diagram. (P.O. Response to ACP at page 52, lines 26 – 31.)

7. Copying by Others

"The Patent Owner respectfully notes however that MPEP 716.06 goes on to state: 'Evidence of copying was persuasive of nonobviousness when an alleged infringer tried for a substantial length of time to design a product or process similar to the claimed invention, but failed and then copied the claimed invention instead. Dow Chemical Co. v. American Cyanamid Co., 837 F.2d 469, 2 USPQ2d 1350 (Fed. Cir. 1987).' The Patent Owner respectfully submits that this is exactly the situation here as evidenced by the fact that Nalco's attempts to come up with a workable solution were an utter failure and it was only after the Nguyen patent issued that Nalco was able to perform the patented method. The Patent Owner respectfully submits that this latter section of MPEP §716.06 fits the facts of the present case more appropriately and demonstrates copying by others." (P.O. Response to ACP at page 53, lines 5 - 19.)

Examiner's Response to Argument K: <u>Secondary Considerations</u>

The Patent Owner has asserted commercial success of the claimed method with a market share of 95% (Weers Decl. at page 7, third full paragraph). The Patent Owner alleged long-felt need in the art that was unfulfilled (Weers Decl. at page 3, line 7 through page 5, line 3). The Patent Owner has argued that failure by others to meet this long-felt need when Nalco twice was unable to demonstrate that its desalting method worked at the Pembroke refinery (Weers Decl. at page 6, last two lines through page 7, line 14). The Patent Owner has asserted copying by others (Nalco) as explained in the Weers' declaration (page 7, last two lines through page 8, line 20.)

Despite the above asserted secondary indicia of non-obviousness, the Examiner maintains the obviousness rejections of Ground of Rejections Nos. 1, 2, 7 and 8 for the following reasons.

The Patent Owner has failed to provide the necessary evidence that EXCALIBUR™ Technology is an embodiment of claim 1 of the Nguyen '943 patent and that the nexus for the success of this method is the presence of one or more hydroxycarboxylic acids in the wash water at pH 6 or below. It is not enough for Dr. Weers, an inventor, to aver that EXCALIBUR™ is an embodiment of claim 1 of the Nguyen '943 patent. The Patent Owner must provide a declaration that sets forth all of the components of the EXCALIBUR™ composition as well each and every step in the application of using the composition to remove metal ions from crude oil. Particularly, it is important to establish that there was no further adjustment of the pH of the wash water after the creation of the emulsion with the mixing valve.

Second, the data upon which the secondary considerations of non-obviousness are based must be commensurate with the scope of the claims. Claim 1 of the Nguyen '943 patent is broadly directed to transferring <u>any</u> metal or <u>any</u> amine from <u>any</u> crude oil into the wash water containing one or more hydroxycarboxylic acids at pH 6 or below. However, the asserted secondary considerations of non-obviousness are all based upon removing a high concentrations of a specific metal ion, calcium, from a specific type of crude oil, Doba. There is no correlation of these specific compounds (i.e., hydroxyacids) to the type of oil to the broad recitation of claim 1.

Third, even if the Patent Owner were to overcome issues one and two above, the asserted secondary considerations would still not be deemed sufficient to overcome the obviousness rejections of Ground of Rejection Nos. 1, 2, 7 and 8 because the critical feature(s) of the claimed method of the Nguyen '943 patent, the specific water-soluble hydroxycarboxylic acid in an aqueous solution at around pH 6, was already taught by Reynolds. Reynolds discloses a wash water having a preferred pH of around 6 (3:35-37) with malic acid and lactic acid as two of the preferred hydroxycarboxylic acids that bind iron and calcium (3:11-25; claim 5). The addition of an acid to the wash water, mixing the wash water with the crude oil to form an intensive emulsion, and the subsequent resolution of the emulsion by electrostatic coalescence was all standard practice in the art of desalting crude oil as explained by Dr. Weers, one of the inventors (Weers' Testimony at 60:14 – 71:1). The use of malic acid or lactic acid in wash water at pH around 6 for the extraction of calcium from crude oil using traditional desalting techniques is no more than "the predictable use of prior art elements according to their established functions" (*KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 413 (2007)*) (upholding district court's summary judgment of invalidity for obviousness despite evidence of commercial success).

For all of the above reasons, the Patent Owner's asserted secondary considerations of commercial success, long-felt need in the art and copying by others are not deemed sufficient to overcome the obviousness rejections of Ground of Rejection Nos. 1, 2, 7 and 8.

Reasons for Confirmation/Patentability

Claim 9 is patentable because this claim as amended requires a water-in-oil emulsifier while each of the Bellos patents ('233, '532 and '592) discloses only oil-in-water demulsifiers.

New claims 27 – 29 are deemed patentable because each of these claims requires the addition of a mineral acid to the wash water which is contrary to the teachings of Reynolds which describes the addition of base to the wash water following the addition of the hydroxy-carboxylic acid to increase the pH to around 6.

Conclusion

Claim 9 is confirmed as patentable. New claims 27 – 29 are patentable. Claims 1, 5, 6, 17, 26 and 30 - 32 are rejected. Claims 2 - 4, 7, 8, 10 - 16 and 18 – 25 are not under reexamination.

This is a RIGHT OF APPEAL NOTICE (RAN); see MPEP § 2673.02 and § 2674. The decision in this Office action as to the patentability or unpatentability of any original patent claim, any proposed amended claim and any new claim in this proceeding is a FINAL DECISION.

No amendment can be made in response to the Right of Appeal Notice in an *inter partes* reexamination. 37 CFR 1.953(c). Further, no affidavit or other evidence can be submitted in an *inter partes* reexamination proceeding after the right of appeal notice, except as provided in 37 CFR 1.981 or as permitted by 37 CFR 41.77(b)(1). 37 CFR 1.116(f).

Each party has a **thirty-day or one-month time period, whichever is longer**, to file a notice of appeal. The patent owner may appeal to the Board of Patent Appeals and

Interferences with respect to any decision adverse to the patentability of any original or proposed amended or new claim of the patent by filing a notice of appeal and paying the fee set forth in 37 CFR 41.20(b)(1). The third party requester may appeal to the Board of Patent Appeals and Interferences with respect to any decision favorable to the patentability of any original or proposed amended or new claim of the patent by filing a notice of appeal and paying the fee set forth in 37 CFR 41.20(b)(1).

In addition, a patent owner who has not filed a notice of appeal may file a notice of cross appeal within **fourteen days of service** of a third party requester's timely filed notice of appeal and pay the fee set forth in 37 CFR 41.20(b)(1). A third party requester who has not filed a notice of appeal may file **a notice of cross appeal within fourteen days of service** of a patent owner's timely filed notice of appeal and pay the fee set forth in 37 CFR 41.20(b)(1).

Any appeal in this proceeding must identify the claim(s) appealed, and must be signed by the patent owner (for a patent owner appeal) or the third party requester (for a third party requester appeal), or their duly authorized attorney or agent.

Any party that does not file a timely notice of appeal or a timely notice of cross appeal will lose the right to appeal from any decision adverse to that party, but will not lose the right to file a respondent brief and fee where it is appropriate for that party to do so. If no party files a timely appeal, the reexamination prosecution will be terminated, and the Director will proceed to issue and publish a certificate under 37 CFR 1.997 in accordance with this Office action.

Extensions of Time

Extensions of time under 37 CFR 1.136(a) will not be permitted in *Inter Partes* Reexamination because the provisions of 37 CFR 1.136 apply only to "an applicant" and not to the Patent Owner in a reexamination proceeding. Extensions of time in an *Inter Partes* Reexamination proceeding are otherwise governed by 37 CFR 1.956 for Patent Owner. It should be noted that **extensions of time under 37 CFR 1.956 are not available to the Third Party requester**. Extensions of time are not available for Third Party Requester comments because a comment period of 30 days from service of Patent Owner's response is set by statute (See 35 U.S.C. 314(b)(3)). Additionally, 35 U.S.C. 314(c) requires that Inter Partes reexamination proceedings "will be conducted with special dispatch" (37 CFR 1.937).

Service on the Other Party (3rd Party Request)

After the filing of a request for reexamination by a third party requester, any document filed by the patent owner or the third party must be served on the other party (or parties) where two or more third party requester proceedings are merged) in the reexamination proceeding in the manner provided in 37 CFR 1.248 (See 37 CFR 1.903 and MPEP 2666.06).

Ongoing Duty to Disclose

The Patent Owner is reminded of the continuing responsibility under 37 C.F.R. 1.985(a) to apprise the Office of any litigation activity, or other prior art concurrent proceeding, involving Patent No.7,497,943 throughout the course of this reexamination proceeding. The Third Party Requester is also reminded of the ability to similarly apprise the Office of any such activity or proceeding throughout the course of this reexamination proceeding. See MPEP §§2686 and 2686.04.

Further Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gary L. Kunz, whose telephone number is 571-272-0887. The examiner can normally be reached on Monday through Friday (with alternative Fridays off) between 10:00 AM and 7:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah Jones, can be reached at 571-272-1535. The fax phone number for the organization where this application or proceeding is assigned is 571-273-9900.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for unpublished applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions about access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

All correspondence relating to this Ex parte Reexamination proceeding should be directed to:

By Electronic Filing System (EFS:

Registered users may submit via the electronic filing system EPS-Web at https://efs.uspto.gov/efile/myportal/efs-registered

By Mail to:

Attn: Mail Stop "Ex Parte Reexam"
Central Reexamination Unit
Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

By hand to:

Customer Service Window
Randolph Building
401 Dulany Street
Alexandria VA 22314

For EFS-Web transmissions, 37 CFR 1.8(a)(1)(i)(C) and (ii) states that correspondence (except for a request for reexamination and a correct or replacement request for reexamination) will be considered timely filed if (a) it is transmitted via the Office's electronic filing system in accordance with 37 CFR 1.6(a)(4), and (b) includes a certificate of transmission for each piece of correspondence stating the date of transmission, which is prior to the expiration of the set period of time in the Office Action.

/Gary L. Kunz/
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